What is claimed is:

1. A semiconductor device, comprising:

a semiconductor layer;

a gate insulator layer formed on the semiconductor layer; and

a gate electrode formed on the gate insulator layer, wherein the atomic ratio of oxygen atoms included in the gate insulator layer is 5 atm. % or below.

2. A semiconductor device, comprising:

a semiconductor layer;

a gate insulator layer formed on the semiconductor layer and having an interface reaction layer; and

a gate electrode formed on the gate insulator layer, wherein the atomic ratio of oxygen atoms included in the gate insulator layer is approximately 5 atm. % or below.

3. The semiconductor device according to Claim 1 or 2, wherein the gate insulator layer is a silicon nitride layer.

4. The semiconductor device according to Claim 3, wherein the silicon nitride layer is formed by the reaction of a nitrogen species activated by plasma excitation directly with the semiconductor layer.

5. The semiconductor device according to any one of Claims 1, 2, or 4, wherein the gate electrode includes a tantalum nitride layer.

6. The semiconductor device according to Claim 5, wherein the tantalum nitride layer is formed by sputtering.

7. A method for manufacturing a semiconductor device, comprising, in the following order:

a) preparing a substrate having a semiconductor layer;

b) transferring the substrate to a first process chamber;

c) providing material to become a gate insulator layer on the semiconductor layer in the first process chamber;

d) transferring the substrate from the first process chamber to a second process chamber via a transfer path; and

e) providing material to become a gate electrode on the gate insulator layer in the second process chamber, wherein in the first process chamber of step c), the transfer path of step d) and the second process chamber of step e), the partial pressure of oxygen is kept at approximately 10 ppm or below.

8. The method for manufacturing a semiconductor device according to Claim 7, wherein the atomic ratio of oxygen atoms included in the gate insulator layer is 5 atm. % or below.

9. The method for manufacturing a semiconductor device according to Claim 7 or 8, wherein the gate insulator layer is a silicon nitride layer.

10. The method for manufacturing a semiconductor device according to Claim 9, wherein the silicon nitride layer is formed by letting a nitrogen species activated by plasma excitation directly react with the semiconductor layer.

11. The method for manufacturing a semiconductor device according to Claim 10, wherein the silicon nitride layer is formed by letting a nitrogen species in a state of high-density plasma with a low electron temperature of 1 eV or less directly react with the semiconductor layer.

12. The method for manufacturing a semiconductor device according to any one of Claims 7, 8, 10, or 11, wherein the gate electrode includes a tantalum nitride layer formed by sputtering.

13. The method for manufacturing a semiconductor device according to Claim 7, wherein said gate electrode is formed using a sputtering method using Xenon gas.

14. The method of claim 13, wherein said gate electrode comprises a bottom tantalum nitride layer of TaNx, wherein x is in the range of approximately 0.25 to approximately 1.0.

15. The method of claim 14, wherein said gate electrode further comprises a tantalum layer and a silicon nitride layer.

16. The method of claim 15, wherein said bottom tantalum nitride layer, said tantalum layer and silicon nitride layer are formed consecutively.

17. The method of claim 7, wherein in step (c), said material comprises nitrogen, ammonia, and a rare gas having a compositional ratio of approximately 7/ 3 / 90.

18. The method of claim 17, wherein a ratio of flow rates of ammonia and rare gas is in the range of approximately 2/98 to approximately 20/80.

19. A method for manufacturing a semiconductor device, comprising:

a) preparing a substrate having a semiconductor layer;

b) transferring the substrate to a first process chamber;

c) providing material to become a gate insulator layer on the semiconductor layer in the first process chamber;

d) transferring the substrate from the first process chamber to a second process chamber via a transfer path; and

e) providing material to become a gate electrode on the gate insulator layer in the second process chamber, wherein in the first process chamber of step c), the transfer path of step d) and the second process chamber of step e), the partial pressure of oxygen is kept at approximately 10 ppm or below.